

## PATENT ABSTRACTS OF JAPAN

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(71)Applicant : NEC TOKIN TOCHIGI LTD

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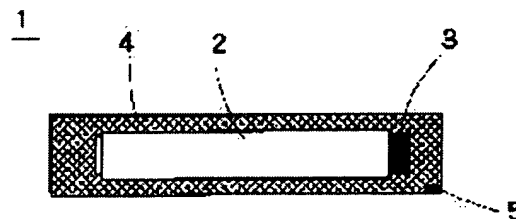
(72)Inventor : KASAI MASAKATSU

## (54) BATTERY PACK

## (57)Abstract:

PROBLEM TO BE SOLVED: To provide a battery pack superior in waterproofness or the like.

SOLUTION: In the battery pack 1 including a cell 2, the cell 2 and a conductive connection terminal 5 between a battery, using apparatus and a circuit component 3 having at least a protection means or a charge/discharge control means are provided inside a mold body formed by synthetic resin and on a surface of the mold body.



## LEGAL STATUS

[Date of request for examination]

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[Date of final disposal for application]

[Patent number]

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CLAIMS

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[Claim(s)]

[Claim 1] The cell pack characterized by having consisted of mold objects which fabricated with the cell the passive circuit elements of the safeguard of a cell, or a charge-and-discharge control means which have either at least with synthetic resin in the cell pack having a cell, and preparing a conductive connection terminal with a cell use device in the front face of a mold object.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the cell pack excellent in especially waterproofness about a cell pack.

[0002]

[Description of the Prior Art] The electronic equipment of pocket molds including a cellular phone is used widely. When an excessive current flows like [ it is few, and / when the terminal of a cell short-circuits ], with the safety device which intercepts energization, it considered being used with a cell simple substance as the cell pack contained to the housing made of synthetic resin, and it has equipped electronic equipment, such as a cellular phone, with the lithium ion battery used for these devices, and the polymer lithium cell. In the cell pack, in order to give waterproofness to housing structure, the fitting section of two or more members which constitute a housing is equipped with the gasket which has elasticity, and preventing permeation of the water inside a cell pack is performed. For this reason, while it was required for two or more members which constitute a housing to prepare the space for wearing of a gasket, there were problems, such as increase of the number of erectors, at the time of assembly. Moreover, when the elastic force of a gasket deteriorated, there was also a trouble that the waterproofing engine performance fell.

[0003] Moreover, in joining using adhesives, after [ which constitutes a housing ] applying adhesives to the joint of one of one members at least, it is pasting up, doubling an adhesion side. However, when adhesives were used, when it needed to set right, or the setting time was conversely short and the gap arose, correction might become difficult so that deformation of each part material might not arise, by the time it would harden, if the setting time uses long adhesives. Moreover, adhesives adhered to the outside of a housing on flash external surface from the plane of composition, and there was also a problem of spoiling a fine sight. Furthermore, in the cell pack of a cellular phone, since a part of structure of a cellular phone was constituted, generally it became a complicated configuration in many cases, the configuration of the fitting section of the housing of a cell pack also became complicated, and obtaining the positive waterproofing engine performance to a fitting side had difficulty.

[0004] Moreover, in the cell pack, the interior of a case is filled up with reactant hot melt resin, and the cell pack which performed immobilization in the case of a cell and adhesion of a case is proposed in JP,2000-243364,A. However, with the rechargeable battery, each conventional cell pack held the means for protection of a rechargeable battery or charge-and-discharge control in the interior of the case made of synthetic resin, and was manufactured. In these cell packs, since it was manufactured through the means of joining by the supersonic wave, adhesion, a \*\*\*\* stop, etc. in order to join a case with a case, it became as complicated as an erector.

[0005]

[Problem(s) to be Solved by the Invention] In a cell pack, the housing which has the complicated fitting section does not need to be used for this invention, it has the positive waterproofness which does not deteriorate for a long period of time, and, moreover, makes it a technical problem to offer a cell pack with easy manufacture.

[0006]

[Means for Solving the Problem] The technical problem of this invention is the cell pack which consisted of mold objects which fabricated with the cell the passive circuit elements of the safeguard of a cell, or a charge-and-discharge control means which have either at least with synthetic resin, and prepared the conductive connection terminal with a cell use device in the front face of a mold object in the cell pack having a cell. The thermal component is prepared in the cell pack and a thermal component is the

aforementioned cell pack which does not touch directly [ the synthetic resin which constitutes a mold object ]. The synthetic resin from which all built-in components constitute a mold object is the aforementioned cell pack which does not touch directly. It is the aforementioned cell pack which really formed the engagement section with a cell use device in the mold object with shaping. It is the aforementioned cell pack by which decoration is carried out to the mold object with one shaping with a muffle-painting sheet.

[0007]

[Embodiment of the Invention] This invention offers the cell pack which formed in one the cell pack which established the means for protection of a rechargeable battery and a rechargeable battery or charge-and-discharge control with the mold object by synthetic resin. Conventionally, a cell pack is held in the interior of the case made of synthetic resin, and is manufactured, and fabricating a cell pack to one by the mold of synthetic resin was not performed. The cell pack of this invention fabricates a cell to one with shaping of synthetic resin with the passive circuit elements which have a cell safeguard or a charge-and-discharge control means, without using the case made of synthetic resin. Therefore, a cell pack with the waterproofing engine performance can be obtained, without being able to form the perfect seal structure, using a case or taking the assembly of a case, and seal chemically-modified degree etc. Moreover, since the cell inside a cell pack etc. is intercepted with the open air, it also makes it possible to also mitigate danger, such as ignition at the time of the abnormalities of a cell.

[0008] The cell pack of this invention is explained with reference to a drawing below. Drawing 1 is drawing explaining one example of this invention, and shows a sectional view. The cell pack 1 of this invention has the passive circuit elements 3 which consist of a cell 2 and a cell safeguard, or a charge-and-discharge control means inside, the perimeter is covered with the mold object 4 made of synthetic resin, and the conductive connection terminal 5 with a cell use device is formed in the front face of the mold object 4.

[0009] Drawing 2 is drawing explaining the manufacture approach of the cell pack of this invention. As shown in drawing 2 (A), the passive circuit elements 3 which consist of a cell 2, a cell safeguard, or a charge-and-discharge control means, and the built-in components 6 which consist of a conductive connection terminal 5 are produced. Subsequently, as shown in drawing 2 (B), the interior of the shaping metal mold which consisted of up metal mold 7 and lower metal mold 8 is equipped with the built-in components 6, and the synthetic resin 9 which carried out heating fusion inside shaping metal mold is poured in. The space formed in the up metal mold 7 and the lower metal mold 8, and the perimeter of the built-in components 6 is filled up with the poured-in synthetic resin 9. Subsequently, if it takes out from metal mold after the poured-in synthetic resin hardens, as shown in drawing 2 (C), the mold object 4 with which the built-in components 6 were completely covered with synthetic resin will be acquired.

[0010] The manufacture approach of the mold object by synthetic resin is performed by pressing fit in the interior of metal mold the synthetic resin fused with heating. In order for most heat of the synthetic resin which carried out heating fusion to radiate heat through metal mold, the thermal effect of the built-in components on a cell etc. is small. However, in order to protect a cell generally at the time of overcharge and overdischarge, when the temperature fuze which will melt if it reaches beyond predetermined temperature, and intercepts energization, or a bigger current than a predetermined current flows, thermal components, such as PTC (forward temperature characteristic thermistor) which intercepts energization, are used for built-in components. When these thermal components are sensitive and are heated by high temperature to temperature, they have a possibility that an operating characteristic may get worse. Therefore, as for thermal components, such as a temperature fuze and PTC, it is desirable to make it not contact the synthetic resin which carried out heating fusion at the time of shaping, and directly.

[0011] Drawing 3 is drawing explaining other examples of this invention. Drawing 3 (A) shows a sectional view and drawing 3 (B) is drawing showing the cross section in an A-A' line in drawing 3 (A). Thermal component 10A, such as PTC and a temperature fuze, is covered with the covering object 11 among passive circuit elements 3, and he is trying not to contact thermal component 10B with the fused synthetic resin which is poured in by the thermal shield 12 in the cell pack 1 shown in drawing 3. Thus, among built-in components, at least, a thermal component can be divided by the covering object or the screen, and the synthetic resin which carried out heating fusion can prevent degradation of the property of a thermal component by making it not contact a thermal component directly.

[0012] As a covering object which performs thermal protection, thermal resistance has elasticity greatly and it is desirable to use heat-resistant rubber recoverable in the case of thermal deformation of a thermal component with bigger thermal resistance than the synthetic resin used for mold. Although various kinds of heat-resistant rubber can be used if it does not deteriorate or deteriorate in case it is filled up with the synthetic resin which carried out heating fusion as heat-resistant rubber, one sort specifically chosen from the group which consists of chloroprene rubber, ethylene propylene rubber, silicone rubber, and silicone denaturation ethylene propylene rubber can be mentioned. The sponge sheet which has cushioning

properties also in these rubber is desirable.

[0013] Although the synthetic resin which carried out heating fusion showed the example it is made not to contact a thermal component directly by drawing 3, you may make it the synthetic resin which carried out heating fusion also to the cell not contact directly. The thermal effect to a cell can be prevented by doing in this way.

[0014] In the cell pack obtained by this invention, the synthetic-resin inlet for mold object formation remains. When un-arranging arises depending on the location of the synthetic-resin inlet which remained at the time of handling, or there are problems -- a fine sight is spoiled -- and the rear face of a cell pack or a device is equipped with a synthetic-resin inlet, forming in the side which faces a device is desirable.

[0015] Drawing 4 is drawing explaining other examples of this invention, and is drawing explaining the inlet section of synthetic resin. In the up metal mold 7, it has a configuration in which the synthetic-resin inlet 14 is established in the crevice 13 formed in the mold object 4 of a cell pack. It becomes unnecessary for this to perform polish of the cutting plane of the synthetic-resin inlet formed in the mold object 4 etc. The cell pack of this invention can mention the thing of not only the thing of the configuration of the shape of a rectangular parallelepiped as shown above but various kinds of configurations.

[0016] Drawing 5 is drawing explaining other examples of this invention. The external surface 12 of the mold object 4 of the cell pack 1 is located on the lower metal mold 6, and external surface 15 is formed in the mold object 4 of the synthetic resin which touches the lower metal mold 6. Moreover, the engagement section 16 to the cell use device equipped with a cell pack is formed in the mold object 4. By this, like a cellular phone, when some cell use devices are equipped with a cell pack, it can carry out to a part of external surface of a cell use device. Moreover, at the time of shaping of the cell pack of this invention, the china-painting sheet printed beforehand may be arranged and decoration may be carried out to the interior of metal mold by the desired color and the pattern layer. By such approach, after pouring in resin into metal mold, the base of a muffle-painting sheet can be exfoliated, and a pattern can be imprinted, or it can unite with the resin which fabricated the muffle-painting sheet, and the decoration of the cell pack front face can be carried out to shaping of a cell pack and coincidence.

[0017] As synthetic resin used for shaping of the cell pack of this invention, although various kinds of synthetic resin can be used, polyamide resin, an epoxy resin, etc. are desirable. Since especially dimer acid system polyamide resin has the property of 135-180 degrees C of softening temperatures, viscosity 1400 - 1800 mPa-s and can pour it in from an inlet with the transfer pressure of 1MPa extent, a cell pack can be manufactured without having a bad influence on the rechargeable battery or internal components inside a cell pack at the time of shaping.

[0018]

[Effect of the Invention] Since the cell pack of this invention produced the cell pack by formation of the mold object of synthetic resin, its process which does not need the synthetic-resin Plastic solid for the housings of a cell pack, and joins a case is unnecessary, and it becomes reducible [ a man day ]. Moreover, since it is formed with the mold object of synthetic resin, it can also perform giving a waterproofing function easily. Moreover, since it is cast by one, it becomes possible to improve the impact by fall etc. Furthermore, since air is intercepted, the interior of a cell pack can also decrease danger, such as ignition and emitting smoke.

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[Translation done.]

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TECHNICAL FIELD

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PRIOR ART

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[Description of the Prior Art] The electronic equipment of pocket molds including a cellular phone is used widely. When an excessive current flows like [ it is few, and / when the terminal of a cell short-circuits ], with the safety device which intercepts energization, it considered being used with a cell simple substance as the cell pack contained to the housing made of synthetic resin, and it has equipped electronic equipment, such as a cellular phone, with the lithium ion battery used for these devices, and the polymer lithium cell. In the cell pack, in order to give waterproofness to housing structure, the fitting section of two or more members which constitute a housing is equipped with the gasket which has elasticity, and preventing permeation of the water inside a cell pack is performed. For this reason, while it was required for two or more members which constitute a housing to prepare the space for wearing of a gasket, there were problems, such as increase of the number of erectors, at the time of assembly. Moreover, when the elastic force of a gasket deteriorated, there was also a trouble that the waterproofing engine performance fell.

[0003] Moreover, in joining using adhesives, after [ which constitutes a housing ] applying adhesives to the joint of one of one members at least, it is pasting up, doubling an adhesion side. However, when adhesives were used, when it needed to set right, or the setting time was conversely short and the gap arose, correction might become difficult so that deformation of each part material might not arise, by the time it would harden, if the setting time uses long adhesives. Moreover, adhesives adhered to the outside of a housing on flash external surface from the plane of composition, and there was also a problem of spoiling a fine sight. Furthermore, in the cell pack of a cellular phone, since a part of structure of a cellular phone was constituted, generally it became a complicated configuration in many cases, the configuration of the fitting section of the housing of a cell pack also became complicated, and obtaining the positive waterproofing engine performance to a fitting side had difficulty.

[0004] Moreover, in the cell pack, the interior of a case is filled up with reactant hot melt resin, and the cell pack which performed immobilization in the case of a cell and adhesion of a case is proposed in JP,2000-243364,A. However, with the rechargeable battery, each conventional cell pack held the means for protection of a rechargeable battery or charge-and-discharge control in the interior of the case made of synthetic resin, and was manufactured. In these cell packs, since it was manufactured through the means of joining by the supersonic wave, adhesion, a \*\*\* stop, etc. in order to join a case with a case, it became as complicated as an erector.

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EFFECT OF THE INVENTION

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[Effect of the Invention] Since the cell pack of this invention produced the cell pack by formation of the mold object of synthetic resin, its process which does not need the synthetic-resin Plastic solid for the housings of a cell pack, and joins a case is unnecessary, and it becomes reducible [ a man day ]. Moreover, since it is formed with the mold object of synthetic resin, it can also perform giving a waterproofing function easily. Moreover, since it is cast by one, it becomes possible to improve the impact by fall etc. Furthermore, since air is intercepted, the interior of a cell pack can also decrease danger, such as ignition and emitting smoke.

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TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] In a cell pack, the housing which has the complicated fitting section does not need to be used for this invention, it has the positive waterproofness which does not deteriorate for a long period of time, and, moreover, makes it a technical problem to offer a cell pack with easy manufacture.

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MEANS

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[Means for Solving the Problem] The technical problem of this invention is the cell pack which consisted of mold objects which fabricated with the cell the passive circuit elements of the safeguard of a cell, or a charge-and-discharge control means which have either at least with synthetic resin, and prepared the conductive connection terminal with a cell use device in the front face of a mold object in the cell pack having a cell. The thermal component is prepared in the cell pack and a thermal component is the aforementioned cell pack which does not touch directly [ the synthetic resin which constitutes a mold object ]. The synthetic resin from which all built-in components constitute a mold object is the aforementioned cell pack which does not touch directly. It is the aforementioned cell pack which really formed the engagement section with a cell use device in the mold object with shaping. It is the aforementioned cell pack by which decoration is carried out to the mold object with one shaping with a muffle-painting sheet.

[0007]

[Embodiment of the Invention] This invention offers the cell pack which formed in one the cell pack which established the means for protection of a rechargeable battery and a rechargeable battery or charge-and-discharge control with the mold object by synthetic resin. Conventionally, a cell pack is held in the interior of the case made of synthetic resin, and is manufactured, and fabricating a cell pack to one by the mold of synthetic resin was not performed. The cell pack of this invention fabricates a cell to one with shaping of synthetic resin with the passive circuit elements which have a cell safeguard or a charge-and-discharge control means, without using the case made of synthetic resin. Therefore, a cell pack with the waterproofing engine performance can be obtained, without being able to form the perfect seal structure, using a case or taking the assembly of a case, and seal chemically-modified degree etc. Moreover, since the cell inside a cell pack etc. is intercepted with the open air, it also makes it possible to also mitigate danger, such as ignition at the time of the abnormalities of a cell.

[0008] The cell pack of this invention is explained with reference to a drawing below. Drawing 1 is drawing explaining one example of this invention, and shows a sectional view. The cell pack 1 of this invention has the passive circuit elements 3 which consist of a cell 2 and a cell safeguard, or a charge-and-discharge control means inside, the perimeter is covered with the mold object 4 made of synthetic resin, and the conductive connection terminal 5 with a cell use device is formed in the front face of the mold object 4.

[0009] Drawing 2 is drawing explaining the manufacture approach of the cell pack of this invention. As shown in drawing 2 (A), the passive circuit elements 3 which consist of a cell 2, a cell safeguard, or a charge-and-discharge control means, and the built-in components 6 which consist of a conductive connection terminal 5 are produced. Subsequently, as shown in drawing 2 (B), the interior of the shaping metal mold which consisted of up metal mold 7 and lower metal mold 8 is equipped with the built-in components 6, and the synthetic resin 9 which carried out heating fusion inside shaping metal mold is poured in. The space formed in the up metal mold 7 and the lower metal mold 8, and the perimeter of the built-in components 6 is filled up with the poured-in synthetic resin 9. Subsequently, if it takes out from metal mold after the poured-in synthetic resin hardens, as shown in drawing 2 (C), the mold object 4 with which the built-in components 6 were completely covered with synthetic resin will be acquired.

[0010] The manufacture approach of the mold object by synthetic resin is performed by pressing fit in the interior of metal mold the synthetic resin fused with heating. In order for most heat of the synthetic resin which carried out heating fusion to radiate heat through metal mold, the thermal effect of the built-in components on a cell etc. is small. However, in order to protect a cell generally at the time of overcharge and overdischarge, when the temperature fuze which will melt if it reaches beyond predetermined temperature, and intercepts energization, or a bigger current than a predetermined current flows, thermal components, such as PTC (forward temperature characteristic thermistor) which intercepts energization,

are used for built-in components. When these thermal components are sensitive and are heated by high temperature to temperature, they have a possibility that an operating characteristic may get worse. Therefore, as for thermal components, such as a temperature fuze and PTC, it is desirable to make it not contact the synthetic resin which carried out heating fusion at the time of shaping, and directly.

[0011] Drawing 3 is drawing explaining other examples of this invention. Drawing 3 (A) shows a sectional view and drawing 3 (B) is drawing showing the cross section in an A-A' line in drawing 3 (A). Thermal component 10A, such as PTC and a temperature fuze, is covered with the covering object 11 among passive circuit elements 3, and he is trying not to contact thermal component 10B with the fused synthetic resin which is poured in by the thermal shield 12 in the cell pack 1 shown in drawing 3. Thus, among built-in components, at least, a thermal component can be divided by the covering object or the screen, and the synthetic resin which carried out heating fusion can prevent degradation of the property of a thermal component by making it not contact a thermal component directly.

[0012] As a covering object which performs thermal protection, thermal resistance has elasticity greatly and it is desirable to use heat-resistant rubber recoverable in the case of thermal deformation of a thermal component with bigger thermal resistance than the synthetic resin used for mold. Although various kinds of heat-resistant rubber can be used if it does not deteriorate or deteriorate in case it is filled up with the synthetic resin which carried out heating fusion as heat-resistant rubber, one sort specifically chosen from the group which consists of chloroprene rubber, ethylene propylene rubber, silicone rubber, and silicone denaturation ethylene propylene rubber can be mentioned. The sponge sheet which has cushioning properties also in these rubber is desirable.

[0013] Although the synthetic resin which carried out heating fusion showed the example it is made not to contact a thermal component directly by drawing 3, you may make it the synthetic resin which carried out heating fusion also to the cell not contact directly. The thermal effect to a cell can be prevented by doing in this way.

[0014] In the cell pack obtained by this invention, the synthetic-resin inlet for mold object formation remains. When un-arranging arises depending on the location of the synthetic-resin inlet which remained at the time of handling, or there are problems -- a fine sight is spoiled -- and the rear face of a cell pack or a device is equipped with a synthetic-resin inlet, forming in the side which faces a device is desirable.

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[0017] As synthetic resin used for shaping of the cell pack of this invention, although various kinds of synthetic resin can be used, polyamide resin, an epoxy resin, etc. are desirable. Since especially dimer acid system polyamide resin has the property of 135-180 degrees C of softening temperatures, viscosity 1400 - 1800 mPa-s and can pour it in from an inlet with the transfer pressure of 1MPa extent, a cell pack can be manufactured without having a bad influence on the rechargeable battery or internal components inside a cell pack at the time of shaping.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] Drawing 1 is drawing explaining one example of this invention.

[Drawing 2] Drawing 2 is drawing explaining the manufacture approach of the cell pack of this invention.

[Drawing 3] Drawing 3 is drawing explaining other examples of this invention.

[Drawing 4] Drawing 4 is drawing explaining other examples of this invention.

[Drawing 5] Drawing 5 is drawing explaining other examples of this invention.

[Description of Notations]

1 -- cell pack and 2 -- a cell, 3 -- passive circuit elements, 4 -- mold object, and 5 -- a conductive connection terminal, components with built-in 6 --, 7 -- up metal mold, and 8 -- lower metal mold, 9 -- synthetic resin, 10A, a 10B-- thermal component, and 11 -- a covering object, 12 -- thermal shield, 13 -- crevice, and 14 -- the external surface of a synthetic-resin inlet and 15 -- mold object, and 16 -- engagement section

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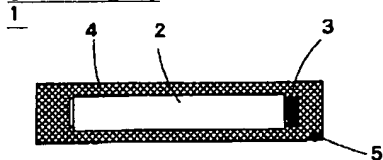
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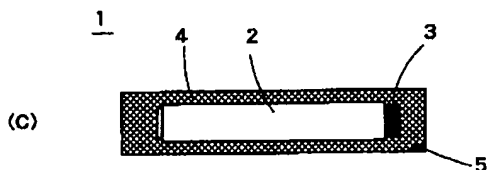
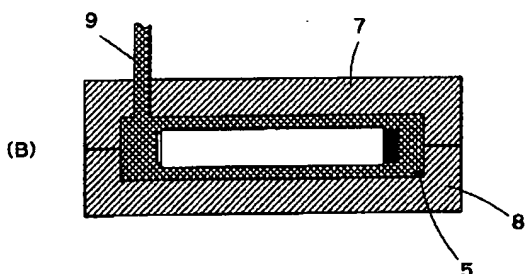
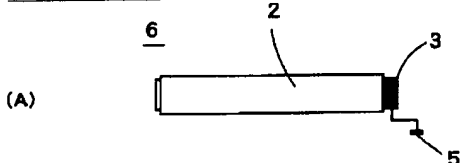
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## DRAWINGS

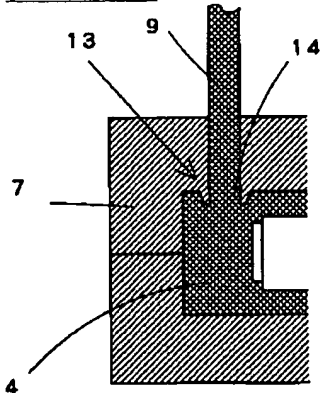
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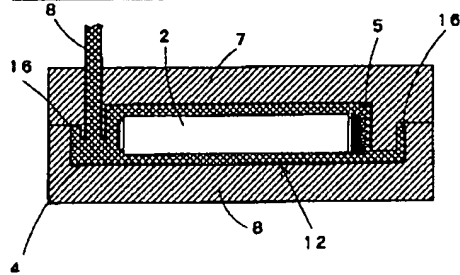
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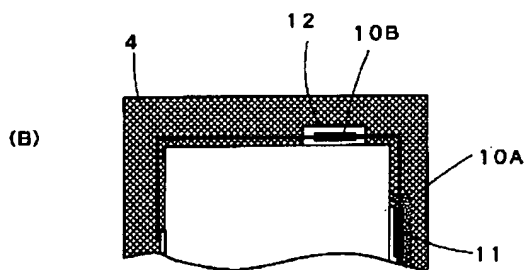
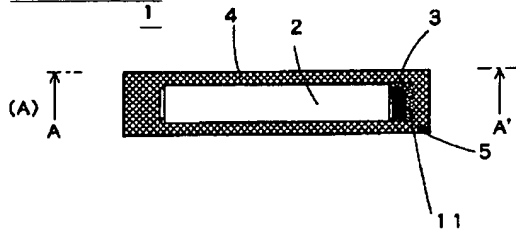
[Drawing 4]



[Drawing 5]



[Drawing 3]



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[Translation done.]